

June 21, 1930

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AVIATION

The Official American Aeronautical Magazine

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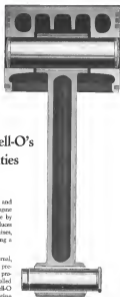


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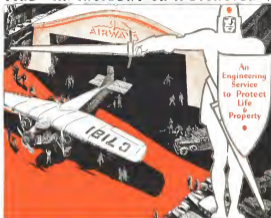
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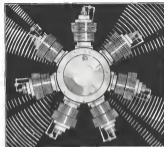


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AVIATION

THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

A McGraw-Hill Publication — ESTABLISHED 1910

EDWARD P. WARNER, Editor

NUMBER 111 . . . June 21, 1936 . . . NUMBER 111



Times Change and We Change with Them

A MESSAGE TO EVERY AVIATION READER

FROM the difficulties of the last two years the aircraft industry emerges with a clear understanding of its own position. The tempo is changing. We are breaking away from the failures and feverish action that everything is going to be different day after tomorrow. We are making progress and it is an orderly progress, not a series of startling leaps first in one direction and then in another.

And that is all to the good. Booms and depressions are rare and fleeting, but they are bad for the nerves and worse for the balance sheet. Steady growth is better and more profitable. Let's quit talking about a "slump." We have seldom used the word in the past. We shall do so still more infrequently in the future. Its employment suggests that the present state of affairs is to be followed by another unpredictable and gaily dash to the clouds, succeeded by another violent nose-dive into a abyss of despair, and so on indefinitely. No such hopelessly thrilling events lie before us. We are engaged in a period of adjustment corresponding to the disposition of a considerable amount of over-produced and unsold stock. It is a necessary prelude to the re-establishment of normal conditions and the subsequent steady and normal expansion of demand and supply of aeronautical services.

We are finding out where we stand, and so is the general public. No longer do they regard us with awe; as pallid goblins with fangs or as makers of weird mysteries. We are known now as partners in a growing public need, and we are judged by the same standards

in which other manufacturers and merchants are judged.

Although the industry is not for the time being increasing its production, it is improving its organization, its subdivisions of interest are sharpening. The aircraft industry is not a single business nor the object of a single passion, but the aggregate of many, all bound together by a certain common interest.

The leaders of aircraft manufacture, of aircraft transport, and of all the unnumbered forms of aircraft operation are making time to study their own jobs from the fundamentals up, to improve and to strengthen the foundations of their own knowledge, and to learn how others handle problems similar to their own.

All this has its effect on aeronautical publishing. It creates new needs and a new attitude towards the trade press, and we are moving to meet them. A trade or a professional magazine is not a static abstraction, but an intelligence division moving forward with the van of the industrial army. We are preparing to move forward now.

Beginning with the August issue, to be distributed shortly before the first of that month, AVIATION will appear monthly instead of weekly. With the increased scope so offered and with the confidence that the reader will have more time to devote to the individual copy of the magazine, we can give to the important trends and occurrences in the aeronautical field a more carefully detailed feature treatment than has been practicable under the stress of weekly issue. We shall preserve the

features that have distinguished AVIATION in the past, and several new ones for which space has heretofore been lacking will be added. Surveys and interpretations of the course of the industry and of aeronautical development will be more frequent than ever before.

General trends in the industry and feature stories as both be presented later upon this new bulletin. Current news, however, demands a more immediate presentation, in a compact and handy form. As a supplement to the service to be rendered by the new AVIATION there will appear upon July 12 and weekly thereafter *The Aviation News*, a concise report of what is going on from day to day and of its interpretation.

A single editorial almost reveal the full implications of an important and novel development of policy. We have given you, our readers, an idea of why we are making the change, growing as it does naturally out of the industry's own development. In the near future we shall have more to say about how we are making it.

//

The Public's Response

A YEAR ago American aviators were suffering from an excess of ill-judged optimism. It had become a meretricious of opinion to express the slightest concern for the future, and prevent of the moment left little opportunity for forecasting in any case. This spring we have been in danger of the far more serious ill of unreasoned gloom. The heave of our report has been cheerfully welcomed, and the darkest rumors have passed current without pause for investigation. Too many of us seem not only to have abandoned the search for good news, but to have become unwilling to recognize it when it is thrust upon our attention.

There have been plenty of disheartening events in 1930, and we would be the last to suggest that they be ignored or belittled; but they make only a part of the budget of aeronautical news. The outstanding fact of the year is that the American public has taken to flying. Great economic problems remain. Operating costs and income still have to be brought into accord with each other, and work for the improvement of reliability and safety will have to go on unchecked, but in the meantime the public is flying. Not all the public. An enormous further increase in traffic is possible and must be had, but the pace we have set is encouraging. Although it is hard to make comparisons, since so many lines were just starting or had not started a year ago, it is safe to say that current traffic has increased at least sixfold, if not ten, in that period. It has been multiplied by four since last October, and every month this year has shown a substantial increase over the preceding one. For 1929, revenue-producing passenger traffic on American air lines aggregated some fifty million passengers.

For 1930, according to the present estimate it should reach two hundred million, or about double the total for the whole world last year.

For this spectacular change of attitude of the potential passenger there are several causes. Reduction of fares comes first to mind, and undoubtedly stands first in importance, but of only slightly less significance is the gradual disappearance by attrition of the aerian that opposes every new idea. Independently of fare and fear and of every other quality, the traveling public needs to get used to the notion of flying. It is seeking out their common sense. We are reaching the final stage of the development of public psychology toward aviation matters. The slogan of a year ago, "Change air-mindedness into air-sanity" is becoming a fact.

Although we must continue to make further headway in the mass direction and the battle is only partly won, our problem here is only incidentally psychological, primarily economic. Airports will arrive in service in which they can pay their way and show a return to the user and they must ultimately do that without direct governmental support. Subsidies are often a necessary transition device, but as a permanent foundation they are dangerous instability. There has been talk from time to time of the need of the moment being provided for designers, or for producers, or for airlines, or for operators. At present we have to have all four, but responsibility for the future lies largely on the technical side. The attention must reach the numerous individuals and industries who can make use of the present-day airplane under conditions profitable to all concerned and convince them of that fact. At the same time, the industry must evolve a craft that, by virtue of cheapness of construction, simplicity of operation, immunity from accidental damage, and cheapness of maintenance will be profitable where present-day types are not.

The purchasing public has begun to learn something about airplanes, and gradually to accept flying as a normal incident of life. In the summer of 1930, more than ever before, the airplane must be equipped with novel facts in place of routine sensation and high-pressure propaganda. For 1931 and all succeeding years, it is the task of the engineer and the manufacturer to brighten up the facts with which the salesman is to be armed for his trip upon the road.

//

Speed!

THE SLOWEST airplane exceeds the normal pace of any other vehicle. Even the slowest commercial airlines have been almost beyond competition from any form of surface transport. But there has been one ray that has been constant through transportation history. However fast you go, it is not fast enough. How-

ever much the of a new conquest exceeds anything known before, it takes only a few months for its inherent users to become blasé.

In 1920, conventional cruising speed as represented by the air mail plane was about 90 miles an hour. In 1930 it has been raised to 120 on many lines. Through all that period the aspiration to 200 mile cruising has been common. If 200 miles had been attained, the cry would have been for a figure still higher. There is no level of permanent satisfaction, and there is no particular figure that the traffic demands. The demand is fact comes more from the pilots than from the customers of transport lines. There are many factors that may prevent particular individuals from using a particular air line at present, but lack of speed is hardly among them.

Of course increased speed is intrinsically desirable—if it can be had without too much sacrifice. Tough travelers by air may feel that the transport planes of the present day go quite fast enough to justify their regular patronage, and, other things being equal, they would be glad to go much faster. More speed is desirable, but it is not in most cases the vital factor in determining commercial success. Whether or not it is worth while to pay the price for securing it is a matter for the user of the airplane, who pays the bills for maintenance and fuel, to determine.

A year ago the urge toward higher velocity was particularly strong. It had become the issue of the hour, and the numerous designs of current speed characteristics that have either been produced in the last six months or are in early prospect time their way in part from that urge, in part from interest in the commercial competition at the Cleveland races last year and in the plans for the meet at Chicago. Their number includes some brilliant examples of the designer's art. Whether his skill is better displayed by that way or in manufacturing some other quality of the plane remains open for investigation, and no single answer will fit all cases.

There are three ways of increasing the speed of an airplane. Aerodynamic efficiency can be increased by cleaning up the design and using better forms, more power can be employed, or wing surface can be clipped. The first is advisable under all circumstances. The second is opposed to economy and must be practiced with discretion. The third cannot be carried very far without becoming definitely objectionable because definitely dangerous.

Other things being equal—such things as power, weight, and wing area,—the average speed of airplanes has been increased about ten per cent in the last eight years. In some cases the increase above the average attained in 1922 with a given power and wing surface was as high as 20 per cent. This is clear gain, for which we thank the engineers. For it is price is paid except perhaps at crowding of passenger accommodations or in production cost. We want more progress in the same direction.

The increase of power is always the easy road to performance. Thanks to the advancements of the engine designer, it has been a road commonly followed. If we have learned anything in all this sprint, it should be that we need more economy in operation, and one way to get economy is by carrying more weight for less power. This habit practice of adding in five hundred by instead of three must be held within reason to make air transport self-supporting.

There remains wing loading. Like the increase of engine power, that is too easy, and therefore too attractive. We can always go faster if we are willing to load faster. Present conditions do not sanction further progress in that direction. Severely and negligently loading speeds have no place in ordinary civil flying. No matter how much the customers for airplanes want speed, they must realize it when they do not intend to accept it at that price.

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More About Air Mail Certificates— An Editorial Correction

RE-READING our own comment on the Warren bill regulation in last week's AVIATION, we find but a confirmation of statement and a merging of two different ideas might have proved misleading. We proceed to amplify.

The approval of a direct and substantial passenger subsidy under the Warren act may be given under either of two conditions. An existing air mail operator carrying a very small amount of mail may find that it becomes practical and expedient for him to carry passengers, and that with a refund less the very high compensation for the air mail, at a rate of about \$5 per ton-mile, will make it worth while for him to carry passengers even at very moderate fares, and will offer him the equivalent of a very liberal subsidy. This applies only to a limited number of cases of existing air mail contracts that have been valid for two years. On the other hand, the Postmaster General may at his discretion assign air mail certificates to existing routes, and in that case the maximum payment fixed by law is forty cents per mile, or for the average transport airplane from five to six cents per passenger-mile. The Post Office Department will, of course, be able to give customers at less than the maximum required by law after competitive bidding, but still favoring the existing operator of a passenger line to any extent the Postmaster General may think desirable.

The figures given in the issue of June 14 thus represent the highly probable and indeed the probably effective subsidies, but assistance may be given at materially lower rates in some cases. The precise result both in compensation per ton-mile for mail handled and in apparent subsidy per passenger-mile will depend on whether the line is an old or a new one.

Racing Seaplanes . . . PRESENT



The winning seaplane, winner of the Schneider Trophy Race

NOW that the Schneider Trophy Race for 1939 is definitely a thing of the past, the question "What next?" naturally arises. Insofar as America is concerned the question must surely be considered one of considerable magnitude. In European countries, especially in Great Britain and Italy, the problem is much less serious because of their more recent completion of more or less successful racing programs but even in these countries the military authorities, at least, have definitely stated their intention of withholding from future participation in the Schneider Trophy Races.

These statements were made immediately subsequent to the last race and were probably largely influenced by popular clamor following publication of data regarding the costs of such programs. The policy has since been roundly attacked in the British aeronautical, technical and trade press and will probably, in addition, be influenced by the results of the present disarmament conference. Any curtailment of the size or number of surface vessels, or, in fact, of land armaments, will inevitably attract attention to the air service. Portents of funds normally expended for other military uses will be applied toward aeronautical development, of which, by no means the least important, will be that of high speed planes. It would therefore seem to be almost certain that the announced policy of other countries will be considerably modified by recent and future developments, if, in fact, these policies were not published in the guise of "herring dross across the trail."

THE QUESTION of the value of racing in aeronautical development has been discussed elsewhere in great detail (AVIATION, August 24, 1939), but without the establishment of conclusions which are universally accepted. It is not the purpose of this article to raise this particular controversy except to point out one or two features which have, as yet, not been stressed. It

is a fundamental experience of man in combat with his enemies that, other things being equal, the combatant who has the advantage of superior speed is the eventual victor.

Secondly, it will be the pilots of the air force possessing the fastest planes who will be the most successful in warfare. They will be able to fight or avoid combat as they choose and their one asset of speed will be of far greater importance than any other factor, such as that of superior numbers. Since progress in racing design will affect all types of planes, it is to be expected that this asset of greater speed, with its accompanying advantages, will be possessed by all types of planes from the smallest fighter to the largest bomber and transport plane. Racing development would therefore seem to be invaluable from the standpoint of national defense, if indeed, it lacked justification from a commercial standpoint. In this field an increase of 10 m.p.h. in the high speed of commercial planes (without increase of loading speed) would be of revolutionary consequence. Such development, as a result of racing plane building is not impossible.

IN THIS CASE of England and Italy, the development of new racing planes may be expected to be a continuation of past experiments. Assuming that the next Schneider Trophy will require a speed of 400 m.p.h., their problem is simply that of increasing the speed of recent planes by from ten to fifteen per cent. This problem is by no means a simple one but its solution lies in the method formerly used, in this country, in developing racing planes. It will be remembered that the first Pulitzer winners were simply "dressed-up" pursuit planes while subsequent races were refinements of the preceding winners. When America entered the Schneider Trophy contest, those were fitted to the Pulitzer winner of the preceding year and the Trophy came to America

AND FUTURE

By JOHN S. KEAN

Project Engineer
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where it was retained until 1926. In that year the American planes were, in accordance with a policy which had by that time become traditional, modifications of the Pulitzer and Schneider Trophy winners of preceding years, but were completely outclassed by the Italian planes designed especially for that Schneider Trophy contest. Since that year, American racing development, on a scale commensurate with that in Europe has been non-existent.

The situation as it exists in America today is out of such nature as to induce optimism. There are no planes, military, commercial or privately owned, with a demonstrated high speed in excess of approximately 257 m.p.h. and very few with speeds greater than 300 m.p.h. There are no pilots with racing experience in racing planes and not more than about a dozen with any such experience. There are no engines with a rated power in excess of 1,200 hp and with the exception of the Packard "N" type engines, of which two have been built, no aircraft engines with rated power in excess of about 800 hp have ever been produced in America nor

In presenting this, the first of a series of three articles on the subject by Mr. Kean, we feel that we are offering our readers something more than the title implies. These articles contain advice helpful for any aircraft designers in the problem of attaining increased performance. They also represent the experience of a man who has been project engineer on all racing plane designs at the Naval Aircraft Factory. Although none of the technical problems of the subject are omitted, Mr. Kean's treatment is such that the material should be interesting not only to the engineer but to the general reader.

have the problems incidental to the use of high compression ratios been satisfactorily solved.

The problem is thus not only that of developing the technical features of racing planes and engines but also that of training pilots and obtaining the planes for such training. It is unthinkable that pilots, without previous experience in planes with a maximum speed in excess of 60 m.p.h. or a high speed exceeding 200 m.p.h. or with floats the reserve buoyancy of which is less than 70 per cent, be expected to step into and fly a racing plane, landing at possibly 115 m.p.h., with a reserve buoyancy of only 50 per cent and with other unusual characteristics incidental to high speed. In Europe, present racing



The 1935 Navy Trophy Race winner, an example of the evolution of deep cockpitable in control during of surface, fuselage and floats

plane. For a racing plane the following relations may be assumed:

$$d_s = 0.35D, \quad d_p = 0.15D \quad \text{and} \quad d_{st} = 0.10D \quad \text{and} \quad d_{st} = 0.35D, \quad d_{st} = 0.35D, \quad \text{and} \quad d_{st} = 0.10D$$

The weight and hence the volume of the engine may be assumed to increase as the power. Hence the cross-sectional area increases as the two-thirds power of the increase in power. Since the cross-sectional area of the body is fixed by the size of the engine, the drag of the fuselage varies as the change in cross-sectional area or as the two-thirds power of the change in power. Hence,

$$\frac{d_{st}}{d_s} = \left(\frac{P}{P_1}\right)^{2/3} \quad \text{or} \quad d_{st} = d_s \left(\frac{P}{P_1}\right)^{2/3}$$

Similarly, the displacement or volume of the floats is a function of the weight of the plane and hence increases

$$\text{as the increase in weight. Since, too, } \frac{W}{W_1} = \frac{P}{P_1}$$

the displacement varies as the power. Displacement represents the volume of a three-dimensional body the cross-sectional area of which varies as the two-thirds power of the change in volume and thus in weight. Since the drag of the floats is proportional to their cross-sectional area, the drag also varies as the two-thirds power of the change in weight or

$$\frac{d_{st}}{d_s} = \left(\frac{W}{W_1}\right)^{2/3} = \left(\frac{P}{P_1}\right)^{2/3} \quad \text{or} \quad d_{st} = d_s \left(\frac{P}{P_1}\right)^{2/3}$$

The drag of the wings increases with the area of the wing. Since the wing loading is assumed constant, the area and hence the drag of the wings vary as the change in weight and hence, since

$$\frac{W}{W_1} = \frac{P}{P_1} \quad \text{as the change in power, or } \frac{d_{st}}{d_s} = \frac{P}{P_1}$$

$$d_{st} = \frac{d_s P}{P_1}$$

Then, substituting in the formula,

$$D_1 = d_{st} + d_p + d_{st}, \quad \text{the values derived above}$$

$$D_1 = d_s \left(\frac{P}{P_1}\right)^{2/3} + d_p \left(\frac{P}{P_1}\right)^{2/3} + \frac{d_s P}{P_1}$$

$$\text{But } d_s = 0.35D,$$

$$\frac{d_p}{d_s} = 0.425 \frac{P}{D},$$

$$\text{and } d_{st} = 0.35D. \text{ Hence}$$

$$= 0.7D \left(\frac{P}{P_1}\right)^{2/3} + \frac{0.425DP}{P_1}$$

$$= D \left[0.7 \left(\frac{P}{P_1}\right)^{2/3} + \frac{0.425P}{P_1} \right]$$

But the power in hp. required to move any body at a speed V (in m.p.h.) is

$$P = \frac{KDV^3}{550} \quad \text{if } d \text{ is the unit drag in pounds}$$

$$\text{or} \quad d = \frac{375P}{KV^3}$$

$$\text{Thus, } D_1 = \frac{375P_1}{KV^3} \quad \text{and } D = \frac{375P}{KV^3}$$

$$\text{And } \frac{375P_1}{KV^3} = \frac{375P}{KV^3} \left[0.7 \left(\frac{P}{P_1}\right)^{2/3} + \frac{0.425P}{P_1} \right]$$

Since the plane was assumed to be geometrically similar, K is the same for both sides of the equation and the above equation reduces, by canceling and transposing terms, to

$$P_1 = \frac{P_1^2}{P} \left[0.7 \left(\frac{P}{P_1}\right)^{2/3} + \frac{0.425P}{P_1} \right] \quad (1)$$

Substituting known values for P and P_1 (in this case the power and high speed of the S-5) and the assumed value for P_1 , the value for P_1 is shown to be 1,450 hp. This is therefore the power indicated to be necessary to obtain a high speed of 360 m.p.h. in a plane geometrically similar to the S-5. This figure was known to be inaccurate but the discrepancy between this and the actual power requirements of the S-5 (1,900 hp.), amounting to 32 per cent, was surprising. It will be noted that the power thus calculated is somewhat larger than that shown on power curve f , Fig. 5, for the race of 1937. The figure shown by this curve is 1,250 hp.

The actual relation between the power required at maximum speeds for the S-5 and S-6 may be obtained from the relation

$$\frac{P_2}{P_1} = \frac{P_2^2}{P_1^2} \quad (2)$$

whence substituting known values for P_1 , P and P_1 $v = 0.158$

This figure indicates that the change in speed is a function of approximately the sixth root of the change in power in planes of the type of the S-5 and S-6. The equations of this figure, as the better shows of the power required to obtain 400 m.p.h. in a plane similar to the S-6 calculated from formula (2), whence

$$P_2 = \frac{P_1^2}{P_1}$$

Substituting known values of P and P_1 , the assumed value of P_1 , and the value of v established above

$$P_1 = 1,700 \text{ hp.}$$

Solving for P_1 in the case of the 400 m.p.h. plane, using formula (1), results in

$$P_1 = 1,300 \text{ hp.}$$

Thus the power required in a plane similar to the S-6 capable of attaining a speed of 400 m.p.h. has been calculated by two independent approximate methods, the greater result being approximately 23.4 per cent greater than the smaller indicated power. It is probable that the actual power required for the plane built along the lines of the S-5 and the S-6 would lie in the neighborhood of 1,400 hp., unless steps are taken to overcome any existing inefficiency of the propeller.

In any case, these power requirements or yet indicated power in excess of 2,000 hp. are of such nature as to make the promise of a suitable engine within the time and financial limits probable. The reasonable policy would therefore, seem to require breaking away from conventional or traditional methods of development and by surveying the field of possible sources of improved performance, endeavor to obtain a 400 m.p.h. plane by the use of new methods of construction and new types of planes.



By W. G. LOGUE

Vice-President, Western Corp. of America

Voice OR Code IN AIRCRAFT RADIO?

wet the pilot to talk directly to his company's headquarters under various conditions, where the distances are not too great and where the interference from static and other stations is small.

Tests indicate that it is dangerous to generalize as to the range to be expected from the type of equipment. The nature of terrain, type of sea, altitude of plane, the communicating frequency used, type of antenna, etc., all contribute to the success or failure of the communication. It might be said, however, that intelligible daylight transmissions are ordinarily carried on with the telephone under the most favorable conditions of atmosphere, frequency, altitude and antenna at distances up to 150 miles when using an output of about 500 watts. Under less favorable conditions, signals may become unintelligible at less than half that distance. Two-way radio telephone has not been used enough in regular transport service for other than experimental basis to permit an exact statement of performance to be expected, and because of this lack of wide commercial application definite statements on reliability, percentage of completed communications under service conditions, and costs of maintenance cannot be given at this time. It can be stated, however, that the large transport companies carried on extensive tests with the radio telephone to find from its planes below it desired to drop the idea and adopt a complete radio telegraph system. The Army and Navy have endeavored to make use of radio telephone in their plane-to-ground and

MOST of the latest air transport companies in the country have come to realize that it will be necessary for them to use a two-way radio communication system if they are successfully to compete with other methods of transportation. The decision to adopt two-way radio immediately gives rise to the question as to the method which will provide the type of service required.

The choice seems to be limited to one of three systems: 1—Two-way radio telephone communication. 2—Two-way radio telegraph communication. 3—Two-way combined telegraph and telephone.

An analysis of the three systems indicates that each of them has its advantages and disadvantages. Each has its special application, which it seems to fill in a manner not paralleled by the others.

In transport service, there are only two main types of planes, mail and passenger. The mail and plane is essentially a one-way carrier and will probably be continued for some time, while passenger planes usually have at least one man in the crew who is available for some duty other than that of flying the ship. This of course does not apply to all passenger carriers, but it is the general rule.

It is a fact, and a generally known one, that radio telephone equipment capable of carrying an reliable voice contact with radio telephone ground stations speaks as much as 200 miles apart and is probably, always will be an inherently complex and weighty apparatus. If voice communication is considered essential in the operation of a radio service, transport companies must resign themselves to the carrying of considerable weight, the assignment of adequate space for the apparatus in the plane which are used, and a rather high first cost and maintenance. Radio telephone equipment in the plane will per-

The battle of communications goes on unabated. Pan-American says one thing, and Easterns agree. T.A.T. says another, and its vote coincides with that of Imperial Airways. The lesson, to whom Marz adds is simpler than Southall and who learns about radio from Anso's 'W' Andy, will unhesitatingly proclaim the superiority of the telephone over telegraph. Mr. Logue holds a very different opinion.

ground-to-plane services, without reliable success. Practically all of the military aircraft communications in the United States are carried on by radio telephone.

RADIO TELEGRAPH transmitting apparatus of very light weight and low power requirement has been developed, and is capable of meeting the wide range of radio telephone equipment of much greater weight and higher power. The telegraph transmitters employed on the planes on one of our longest routes have an output of from 12 to 15 watts, and under adverse atmospheric conditions maintain consistent service at distances of more than 125 miles. Here, too, the various factors make it difficult to lay down specific distances to be expected, but as a rule where the two types of transmitters of equal power output are used and operated under similar conditions, the telegraph will provide communication at three to four times the distance covered by telephone.

A direct comparison of total weights to be expected in installing accurate telegraph and telephone equipment for two-way communication is apt at this point. In all instances where the 20-watt telegraph transmitter is installed in this comparison it should be remembered that the set is designed for both telegraph and telephone operation, and that this design is a compromise between the telegraph features as used in rather limited ways compared to that obtained with code. The total weight of all of the apparatus in the plane required for two-way radio telephone with 50-watt output is figured at approximately 125 pounds. This figure includes the transmitter, the receiver and all accessories except the antenna. On the same basis all equipment required for two-way telegraphy of 20-watt output, which has a greater range than the 50-watt telephone equipment, is figured at 62½ pounds. These figures are arrived at on the assumption that all transmitters will operate from a dynamotor source of supply. If other power sources should be found more desirable the total weight might change in such instance, but the ratio of weights would remain practically unchanged. The weight of the telegraph transmitter is placed at 11 pounds. The telegraph transmitter with its dynamotor weighs 24 pounds while the telephone transmitter with its dynamotor and starter weighs 66 pounds. No starter is required for the small dynamotor used with the telegraph transmitter.

Practically all of our passenger planes and the larger mail planes carry storage batteries and battery charging gear for their lighting, even though the planes are not fitted with radio transmitters. The 60-65 ampere hour battery and 15-ampere charger are used as a basis in comparing comparative weight because these sizes are used in such quantity that their acceptance as an average standard appears justified. No additional capacity would be required if such planes were to be fitted with the 20-watt radio telegraph transmitter unless the starting and lighting down was exceptionally heavy, but a larger battery (120 ampere hour) and generator (30 ampere) would be almost a necessity in the case of a plane equipped with a 50-watt completely modified telephone transmitter if the battery was needed for starting, lighting and radio. In other words the 60-65 ampere hour battery and 15-ampere charging generator would not stand up under the heavy drain occasioned by the use of the 50-watt telephone transmitter. Additional capacity would be required for both units. This means additional weight, increasing the battery capacity from 65 to 120 ampere hours would be good practice and would increase the battery weight by 30 pounds. Increasing the charging

rate from 15 to 30 amperes would also be good practice and quite necessary. It would increase the charger weight 30 pounds. The weight of this is battery and charger would entail a gross weight increase of 60 pounds which, when added to the weight of the radio telephone communication equipment, shows a total weight of 125 pounds or 113½ pounds more than the total weight required on the plane for two-way radio telegraph operation.

No additional personnel is required in the plane where telegraph is used. In the case of one-man ships, pilots can learn to handle the telegraph equipment within a very short time if they do not already know it, or, alternatively, transmission from the plane to the ground with telephone transmission to the plane can be used during the time that the pilot is taking code instruction. A large number of air mail pilots are ex-Army men who are already familiar with the telegraph code, and they would have no difficulty in breaking up their code work to the extent required. For multi-engine passenger carriers engaged in route flying, it would seem logical to have licensed radio operators whose primary duty would be communication with secondary duties as flight, escort, courier, steward, engineer or co-pilot. The qualifications necessary for assuming a commercial radio operator's license of today are different from those with which a great many Americans become familiar some years ago. The licensed radio operators of today are, as a class, glad to assume additional duties and in instances where the personnel set-up permits this to be done the omission of the radio operator's duty is well as the possible loss of



Showing a regular airport transmitter with the down pipe.



A 100 watt conventional telegraph and telephone transmitter in the plane mounting frame.

pay load due to the fact that an operator is carried is automatically excluded.

Missions originating on one-man planes will consist, in the main, of positive reports, reports of information weather conditions and acknowledgments. All of these can be sent by the pilot in telegraph code quicker, and usually with less effort, than when voice is used except at short ranges. Each positive report, weather report and acknowledgment can be transmitted in his controlling ground station by our government Morse character. The telegraph communication will usually save time and effort because they are more ready "read" through at atmospheric distances and through signals from other stations. Voice messages are very difficult ones to "copy" through heavy atmospheres because so many of the voice frequency approximate those of static. The use of the telegraph signal can be used to secure best results under conditions of this kind.

It is often suggested that the short wave lengths can be used in order to get away from heavy static. This can be done in certain point-to-point communications, but it has proven impractical in mobile communications, where both long and short ranges are considered due to the "fade" effect of these higher frequencies unless means are provided for varying the wave length used on the plane and on the ground station transmitters to effect it. [For some more detailed comment on this point see the report of Herbert Hoover, Jr.'s S.A.E. paper in Aviation for Mar. 1, 1939 p. 445-46]. These wave length changes would, of course, have to be made on the plane while it is in flight and inasmuch as American radio telephone practice demands remote control of the transmitter in the plane a wave-length system is somewhat complicated. No means for manually shifting waves in the air has been provided on modern American airplane transmitters. Certain types of adsignaph signals are not so subject to the bad effect of static distances as are the signals from radio telephone transmitters, and the use of the apparatus will permit of its installation in parts of the plane where the desired wavelength changes can be made locally by the operator.

Our large air school in the Middle West is now installing a course of instruction. All student transport pilots will be required to qualify in the telegraph code. The management of the school has visualized the need for 100 per cent communication on one-man ships. They are not thinking of multi-engine ones, for in that case

the pilot already has a heavy job and radio cannot be a part of his flight duty. This will apply even more forcibly if the need to larger plane communications.

As previously stated one large American transport company has discarded all attempts at radio telephone communication with its planes. Another is equipping all of its pilots and co-pilots to learn telegraph with the idea of equipping its planes with telegraph apparatus as soon as this is accomplished, and at least one of the largest European companies, the Deutsche Luftfahrt, invariably uses radio telegraph in its plane communications. The reason for their choice is not probably be based somewhat as follows:

- (a) Radio telegraph apparatus in the plane is less complex than radio telephone apparatus, and is therefore less liable to failure.
- (b) It is lighter in weight and less bulky.
- (c) It is more economical. This applies to first cost as well as maintenance.
- (d) It provides increased reliability of communications because telegraph signals are easier to "read" than telephone signals under bad atmospheric conditions and certain types of telegraph signals are less subject to slipping and fading.
- (e) Telegraph signals cause less interference. Telephone communications occupy many times as much space in the ether as a telegraph signal. This is important in a service where the available frequency is so scarce.

These six matters which will solve themselves in time, as transport executives will sooner or later familiarize themselves with the results of these systems and if they ever become convinced that high-power two-way radio telephone communications with aircraft is an expensive luxury as to weight, cost and dependability under adverse conditions and at long ranges, they will insist on having long-range plane-to-ground telegraph communications and use the low-power radio telephone only when near the airport.

EXTENSIVE gained in other lands is of obvious interest to us. In American practice demands the use of training was announced on the airplane, and all commercial communications are carried out on the intermediate frequencies. American transport executives are a whole lot more on the use of wave antenna and the use of the higher frequencies for communication. European operators do not seem to be as much concerned as ours are about the weight of the radio equipment in the plane. It merely follows that radio apparatus of greater output is certainly used over there. Most of the sets used on European planes have an output of from 70 to 100 watts, although outputs of as low as ten watts are used on some planes where telegraph is the only long-range telephony. Some very good results with radio telephone have been obtained with this set-up (i.e. making voice and intermediate frequencies on rather high waves) but generally all of the equipment is arranged for both telegraph and telegraph operation. The German operators, however, always use telegraph rather than telephone in their plane-to-ground and ground-to-plane communications. This obscures the language difficulty, speeds up long-distance communications, minimizes interference and provides a written record of such communications. Some of the large new German planes are fitted with a special compartment for the radio equipment and the radio operator.

In England all airport-to-airport communications are carried out by radio telegraph on intermediate wave lengths (approximately 1,300 meters) and the ground

transmitters in all cases are arranged for both telegraph and radio telegraph transmission so that the radio apparatus can be used for telephone communication to places if desired. The antenna output of these ground sets, as well as of the transmitters used for communication with planes, is about one and one-half kilowatts (English places do not use any high frequency (short wave) transmitters for commercial work. Some experimental work has been done along this line, but the results so far have not warranted a change.

For the transport or sporting pilot who does not usually fly bad weather and whose flying is done within a limited area, radio telephone may prove a valuable aid. This is true of all types of flying where only short-range communication is needed. The fact is recognized by radio equipment makers and the telegraph apparatus which is designed for long-distance communication will also be arranged for voice communication at short range, so that the pilot himself can talk to his ground officials when short to make a landing at the airport, just as a commercial captain communicates to his chief master and two-third captain when he is dodging his vessel. The master of a large steamer does not handle his routine long-distance communications through out the voyage, however, because he is occupied with the safe navigation of his ship. Routine communications are handled by a man especially trained in this type of service—the radio operator. On most small boats the master is also the radio operator as well and on still smaller vessels the master himself maintains the radio link, weather reports and radio directions.

There are certain portions of the United States in which two-way radio telephone may also be a success in transport work if the ground stations are not spaced too far apart. This will probably prove true of the Pacific Coast and the Northwestern section of the country, where heavy storm conditions are practically unknown and where the traffic must be handled only by telegraph, and therefore the transport companies that use a radio-telegraph system can also obtain facilities for point-to-point work can effect enormous savings in line-of-telegraph tolls and rentals paid for leased lines. An extensive ground organization for maintenance of radio telephone sets on the planes will be required, and this organization need not be as large nor as highly trained if it is made of a complete radio-telegraph system. Licensed radio operators can be held responsible for the maintenance of the simple type of equipment they use.

Radio telephone enthusiasts may refer to the excellent radio-graphic results obtained in the air weather stations of the Airways Division of the Department of Commerce. These transmitters are designed for both telegraph and telephone operation and are used at 2,000 foot-outpost, operating on frequencies far removed from those on which ship efforts are made. The high output was thought necessary for getting weather broadcasts through to the planes under adverse conditions at distances of 100-125 miles.

It may be pointed out that the radio operator cannot take the place of one crew member in all cases in which crew his presence on the payroll must not be overlooked. High operators should receive not less than \$150 a month and this expense will have to be warranted before operators will consider leaving their jobs. In order to give this subject fair treatment it must be considered jointly with such matters as equipment cost, maintenance, obsolescence, efficiency of communication and safety. Radio operators are suggested for the large passenger carriers for an economic reason, because one hundred and fifty dollars a month is considered cheap insurance on the lives of the crew, a large number of passengers and forty to one hundred thousand dollars worth of airplane

A radio operator on the plane, with the proper lightweight radio telegraph apparatus, will practically render communications at all times and under all conditions. It had neither the pilot at planes equipped with radio telegraph apparatus operated by himself can give the radio operators only incidental attention. He must concentrate on flying the ship. It is at such times as that that radio communication is most needed, but the pilot will have neither the time nor the patience to repeat each spoken word as many as three or four times in order to make his message intelligible at a distant ground station. All too often station masters and his equals are disappointed by extraordinary state conditions which render any kind of communication difficult and generally prohibit radio telephone communication except at very short ranges. A two-way radio service in aircraft work must be of a type which will provide 100 per cent communication or it will have failed in its purpose. Seventy-five per cent communication will bring nothing but gray hairs to executives and pilots alike, and nothing short of continuous contact with the plane under all conditions will provide the safety necessary to transport operations. It has been demonstrated through years of experience that radio telegraph is the safest means of maintaining radio contact at long ranges and under the worst operating conditions.

Two-way radio controlled radio telephone apparatus in the plane now costs more than three times as much as two-way telegraph apparatus capable of working the same or greater distances and radio telephone ground transmitters now cost from one-third to one-fourth more than ground telegraph equipment. If of equal power the radio telephone transmitter will have only about one-fourth the range, and more of them will therefore be required to provide constant communication along the route. Airport-to-airport traffic must be handled by radio telegraph. When ground stations are licensed for point-to-point work the traffic must be handled only by telegraph, and therefore the transport companies that use a radio-telegraph system can also obtain facilities for point-to-point work can effect enormous savings in line-of-telegraph tolls and rentals paid for leased lines. An extensive ground organization for maintenance of radio telephone sets on the planes will be required, and this organization need not be as large nor as highly trained if it is made of a complete radio-telegraph system. Licensed radio operators can be held responsible for the maintenance of the simple type of equipment they use.

Radio obsolescence of the plane equipment and its consequent replacement should also be considered. A fair estimate of the useful life of radio equipment on airplanes would be three years. The yearly write-off on radio telephone equipment can be considered at at least twice that of radio telegraph apparatus. At present price levels the yearly depreciation of each complete five-watt airplane transmitter on the above basis would be approximately \$700. Two of such comparable telegraph transmitters would not exceed \$250.

The matter of communication in the aircraft field is fundamentally no different than on other well known aviation communication fields. Radio communication is a basic thing and the primary requirement as suggested by years of experience used in many other services can find application in the aircraft field. When the subject has been completely analyzed it will be seen that the tried and proven methods can also be applied to air transport and no doubt they eventually will.

THE AIRPORT ON A *Paying Basis*

How Fairfax Airport, Kansas City, Was Planned and Developed to Make Possible a Maximum Return From the Investment

By JAMES P. WINES

PROFIT through each of the first 30 one oil operations is a type of large expenditures for improvements, at the close of the management of Fairfax Airport, Kansas City, Kansas. The field was taken over in October, 1928, by Woods Brothers Corporation, which is well-known in the Middle West for its river control work, and was operated first through Fairfax Aircraft Company, a subsidiary, and later through Fairfax Airport, Inc., in which the Woods Brothers firm retained a quarter interest.

The financial success of Fairfax Airport is due in part, but by no means entirely, to the discovery of natural gas deposits on the property. Further wells have been drilled and are now producing approximately 22,000,000 cu ft of gas a day. There is a possibility that gas may be used for heating the buildings and as fuel for the manufacturing plants both on the airport property and in the Fairfax industrial district which fronts it to the west and south. Gas for these purposes is sold at retail at an average price of 35c. per 1,000 cu ft, while the excess not utilized by the airport or the industrial district is sold to The Cities Service Gas Company at 18c. per 1,000 cu ft. Aside from the profits realized by this management, it will be seen that the ruling governing the use of gas is advantageous in that there can be no molasses near enough the field to constitute a hazard for the planes operating from it.

Of course, it is not to be expected that the operators of airports everywhere will be able to find gas deposits on their property. In fact, it is rather unusual although there are probably deposits of other types at some fields. The nearest airport at Long Beach, Calif., is in an oil



Air view of Fairfax Airport, Aug. 4, 1929, when the field was formally dedicated.

producing area and might form an excellent oil field. Unlike gas, though, power is necessary to bring oil to the surface while gas is forced up under its own pressure. At Fairfax Airport the gas seeps to the surface at 185 ft. The wells are shut with the field and the gas is carried off in underground pipe lines, so that there is nothing to form an obstruction. The discovery of natural gas at the Fairfax field, though, and its use is, of course, simply an example of how the management has utilized the by-products.

HANDLING and largest size results, naturally, form a large part of the success that is claimed for the airport. The results are computed according to a sliding scale, which takes into consideration the amount of space to be leased, the type of operations to be conducted, the length of the lease, and so on. Provisions are made also for increase in rent when the operations conducted by a

lease increase beyond a specified point. At present, the lease rate charged those operating from the field are from \$2,000 to \$10,000 annually. The majority of leases are for a period of 10 yr, although Carlin-Wright Travel Service, Inc., holds a 20-yr. lease on a plot of ground 100,000 ft. which is now occupied by its two hangars, and Universal Airplane Corporation has its own building on a lesser tract 780,000 ft. In all the leases, the management has agreed that no rent will be treated at any date in the future for proportionally less money. The leases also contain mutual options with the proviso that increases in rentals upon the expiration of the present agreements may be submitted to a board or arbitration. Recently rental of large space, likewise being the airport company revenue. The rates for storage in an unheated hangar vary from \$30 to \$75 per month, depending upon the square feet of wing area of the individual planes. For storage in a heated hangar, the rate is from \$40 to \$125. Transient planes are accommodated inside a hangar for \$10 to \$20, \$100, \$500 or \$750 as the case may be, while a charge for take-down privileges varies from \$100 to \$300 a night. The take-down price is flexible set high to discourage the presence.

A large portion of the airport profits are also obtained from the sales of fuel and oil. Gasoline is purchased in tank car quantities and is stored in large tanks alongside the railroad siding to the west of the field. These tanks are connected with fueling lots in front of the hangars by 4-in. gas lines. There is a credit of 2½¢ on each gallon of fuel sold from the tanks, which affords a suitable income when the operations conducted at the field are taken into consideration. Standard Oil Company (Indiana) and Independent Oil and Gas Company supply the tank car fuel. In addition, such sources maintain a gas truck at the airport. Budfield Oil Company of California also keeps a truck here. The management, of course, receives its cut on all gasoline and oil sold from these trucks.

THE RESTAURANT at the field is a small one and is operated as a canteen. A modern dining room, which will occupy the lower floor of one wing of the new administration building, almost ready for use, is to be operated on a similar basis. Incidentally, the restaurant represents a direct investment of the management to a degree of three-quarters of a mile from the airport boundaries as controlled by Woods Brothers. As a result, there will be no competition with the restaurant on the field.

Western Union and Postal Telegraph offices will be housed in the administration building on a permissive arrangement, and the local Yellow Cab Company will pay for the privilege of maintaining a taxi stand there. A cigar counter in the structure is to be operated by the airport management, and all of the food and refreshment have been retained solely as airport activities.

Another source of revenue lies in servicing. Mechanics are on duty at all times and will effect minor repairs on transient planes and those stored at the field. The profit from this work is split 50-50 between the airport and the mechanic. It is understood that will become increasingly important. It may be that the airport will eventually contain a complete aircraft and engine overhaul shop, although now, when extensive repairs on a plane are necessary, the plane is turned over to one of the operators that is prepared to handle it.

The view of the field taken August 4, 1929, when at

was officially dedicated, shows east parked along both the western and northern boundaries. The crowd at the field that day was enormous and the photograph shows the spaces saved for parking. These spaces will be rearranged as the airport building program is carried forward. A 70-room hotel is to be erected diagonally across Fairfax Road from the administration building, and an extremely large space for automobiles is to be provided behind it, since all activities will center at that corner of the field.

It will be seen that officials of Fairfax Airways, Inc., have adopted or plan to adopt almost every known means for increasing the income of an aviation field. However, they do not intend to stop there. The company is maintaining several auxiliary fields to the north along the Missouri River.

One of these points is at Weston, Mo., which is in a section largely devoted to the raising of tobacco. A flying school is planned for that field, and arrangements have been made for the use of the field by the students in the tobacco fields as a means of saving them the pay for their aviation instruction. Such a system will undoubtedly bring many pupils. In addition to that, the airport management will have some 60 acres of land available between the river and the airport to be planned there. It has also been suggested that the hangar be constructed to provide space for the drying of tobacco as well as for the storage of planes. The idea sounds well, but knowing something of the operations of Woods Brothers, one can neither say that it is impossible nor improbable.

PURSUING THE CASE REGARDING LOSS OF REVENUE, however, will appear on the books of the Fairfax field at Kansas City upon the opening of the administration building. Pay tolls have been assessed in the structure and the management contends that they will net the company \$2,000 annually.

The river bottom area now occupied by the Fairfax field was first used as an air field shortly after the outbreak of the war. In 1918, the government, in 1920, the determination of the first persons to recognize the value of the property for this purpose, however, is more difficult. Some say that James H. Cohen was the first, that he made use of the land as a hub of operations for passenger carrying and also for carrying mail. Cohen is connected with the "Voice from the Sky" headquarters. Others claim that "Ben" Gregory was the first one to land a plane there. However, the prize for making the first landing belongs definitely goes to "Tommy" O'Laughlin, since there seems to be no other claimant. O'Laughlin, B.I. England, farmer-garage owner and airplane enthusiast of Kansas City, tells the story of how he furnished and installed a new propeller to replace the one that was damaged when O'Laughlin's plane went over after being landed there.

In any event, E. J. Swenson, operator of a local automobile school, leased a 120-acre tract of land from Woods Brothers and opened a flying school in 1925. The field then became known as the Swenson Airport. The natural beauty of the property and its proximity to Kansas City, Mo., of course, were governing factors in his choice as the location for the school. The present airport, an outgrowth of the one started by Mr. Swenson, is but 10 mi. by motor car from Kansas City, Mo., and is generally known by the name of Kansas City, Mo.

The flying school project severely did not dare

June 25, 1930

particularly well, for the Swenson Airport was taken over by Woods Brothers in October, 1928. To operate the field, Fairfax Airport Company, Inc., was formed with a capitalization of \$100,000. Gay E. Swenson, vice-president and general manager of Woods Brothers Corporation, which is the holding company for the separate organizations conducting the varied Woods Brothers activities, became the head of the airport concern, and R. P. Craig, now the assistant manager of the Kansas City branch of Woods Brothers Corporation, was chosen to serve as vice-president and general manager. The present airport operating company, Fairfax Airways, Inc., is likewise headed by Mr. Swenson.

The Swenson school had erected a sheet metal hangar to house the school planes and a small wooden club



The hangar of Lincoln-Flying Flying Service on Fairfax Airport. There is a clubhouse on the lower floor.

house for the use of the students. Both of these structures are still in use, although the hangar is to be moved to one of the auxiliary fields.

The first improvement used by the new management was the distribution of 200 carloads of cement around the building and in front of the hangars. For this purpose, to pay the cost of erecting a new \$60,000 ft. hangar, now used for transient planes and to cover the operating expenses for the coming year, the airport management requested the executive board of the company to authorize the sum of \$40,000. This was done, but it is according to some estimate of \$40,000, that the company made over in the last 10 months over a total of \$1,310,000 and the total expenditures including those of auxiliary fields will probably reach \$1,000,000.

While the new hangar was in the course of construction, negotiations were in progress with officials of American Eagle Airlines Corporation concerning the removal of its plant to a site to the west of the field. As a result of these negotiations, a new factory building for the airplane manufacturing concern was erected, and, in addition, the original Swenson hangar was leased to "Center-field Flying School. Soon after that the first transient operations were conducted at Fairfax Airport were inaugurated.

Mr. Craig, who was then the general manager of the field, tells the story of how he "lost" Dick Plesing, Kansas City operations manager of National Air Transport, Inc., on the street the afternoon of December 3. Mr. Plesing, according to the story, told him that the Kansas City municipal field, then in the course of construction, was in a sorry state, and that it was desirable that it was desirable for the operations. Because of that situation, the N.A.T. planes were to land at the St. Joseph, Mo., airport that night and until the municipal field could be used again. St. Joseph is 64 miles from Kansas City and the next morning would have to be

trucked between the two cities. Then, Mr. Craig, says, he suggested the use of Fairfax Airport.

It will be remembered that the property on which Fairfax Airport is located and that surrounding it is river bottom land. The soil is alluvial and was formed by the action of the Missouri River over a long period of time. It consists first of a stratum of coarse sand, one of fine sand, and, finally, a 24-in. layer of dirt which was deposited over the entire area at the time of the 1903 flood. The point is that the field was inconspicuously dry, because of the natural drainage system provided by the composition of the soil. However, there were several objections to its use in night flying operations. There was a low spot in the center of the field and a hole had been dynamited in shore of the water that had collected. There were also some trees at the southern corner. The chief objection to the use of the Fairfax field by the N.A.T. planes, though, was that it was neglected. But all of these difficulties were done away with before nightfall.

Following Mr. Plesing's approval and his aid, Woods Brothers' engineers were set to work. Forty-eight construction "smoke pots" were laid out at 200-ft. intervals around the field to serve as border lights. A number of floodlights were secured and looked up temporarily to illuminate the airport buildings. To illuminate the sand dunes, ordinary electric light bulbs, placed in green paint, were screwed into sockets mounted on beams containing large storage batteries. Three of these makeshift lights were used, and instructions were issued to pilots to fly over two of them and land toward one. The trees at the southwest corner of the field were cut down, the hole was filled in, and that night and every night from June 15 the road was brought into Fairfax Airport.

THE PRELIMINARY acquisition of National Air Transport as an operator revealed the possibilities of Fairfax Airport and added impetus to its development under the management of Woods Brothers. It was decided that the use of the field would be enlarged immediately to cover the entire 264-acre tract bounded by Stanton and Fairfax Roads, and the 15-in. sand layer was to be constructed along the river to prevent the possibility of the land being inundated at high water. It was further decided to incorporate what had been Goose Island in the part as soon as possible. The island was in the light of the river and was separated from the mainland by a siltier canal about 100 ft. wide.

This cut-off was put a few feet lower than the land on either side, and the river flowed through it only at flood tides. Knowing the action of the river, which fills in a comparatively short time, it was a proposition encouraged Woods Brothers Construction Company to install a complete line of its river control work to catch the particles of soil carried into the channel during the high water stages. The channel is still too low by about three feet, but the high water this month (June) is expected to bring it up to the proper level, when the present levee can be dropped off and a new one constructed to protect the island and the channel. That will bring the total airport acreage up to 779.5.

Plans for the improvement of Fairfax Airport were made accordingly with a determination to include Goose Island and the channel as a part of it. It was decided that brick hangars would be placed along the west side of the field in line with the sheet metal structures and that an administrative building would be constructed at the southwest corner. When the building program is

that side of the field was completed, the plans called for an extension of Patton Road to the site, which has been done, and the erection of buildings along the southern boundary. An extensive landscaping program was ordered, the runways were planned out, and a lighting system was designed. A drainage system, at first considered unnecessary, was later incorporated in the plans for the development of the port.

THE FIRST step in the improvement of the field, at Foxboro, was the preparation of the remainder of the land inside the present levee for arable use. The surface was level enough for most purposes, but not sufficiently so to allow planes to land and take off without involving some hazard. As a result the ground to the north of the 135-acre field was graded, a small pit in iron by the time that the deposit was out. The land to the south, on the other hand, needed only rolling. It had been used to a certain extent for farming and was in excellent condition. This work was followed by the carrying out of the development program in as far as the 234 acres that had been specified in the contract.

In the meantime the airport management was out for more business. Foxborough Flying School had already taken out of the steel metal hangars on the field, while American Eagle Airlines Corporation had opened a new facility on the other side of Foxboro Road. Curtiss-Wright Service was the next to sign up for space on the airport, and was followed shortly by Universal Aviation Corporation. Robert A. Venable, Inc., manufacturers of the Kato-Rover bus and Inland Aviation Company, which is now producing the Inland sport, have also taken space. These two firms have moved into a factory building, erected to the south of the new administration building at the junction of Fairfax and Patton Roads. Universal Air Lines and Southern Air Transport are using the part of a Kansas City, Mo., based operation, and other transport and mail lines are negotiating for use of the field. There are, of course, a number of aerial service operators on the field.

Besides the mail restaurant and the two metal hangars, there are now five other buildings on the airport, including the hangars which are in reality in the Fairfax industrial district. Two of the structures are the Curtiss buildings, and were erected by the flying service following the approval by the airport management committee of the plans presented. While of course they are not unique the same is every architectural design as those designed by the airport architects, the buildings are in keeping with the others on the field. The same thing is true

of the hangar used by Universal Aviation Corporation. The Curtiss structures are, of the same size, measuring 120x120 ft. Each is primarily for the storage of planes used in aerial photography, aerial instruction, magazine and charter work. In addition, the north one houses a movie department and some of the ground school classrooms, while the south hangar houses more classrooms, offices of the local Curtiss-Wright organization and a classroom. The building occupied by Universal Aviation Corporation is 125x172 ft. This hangar has a 2-story addition along the south wall, and houses a passenger terminal, offices for officials of the company, quarters for pilots, student classrooms and a complete aircraft overhaul shop. An engine overhaul shop is maintained in a hulk hangar.

The fourth building at the field is what is known locally as the "sales hangar." This was in its early two levels and steel hangars, each 100x300 ft. There are less than 10 in both ends that house separate heating units and 14x14 ft. offices. The two sections are commercial hangars.

The new administration building, the fifth structure, will be ready for occupancy this month (June). When it is opened Fairfax Airport will have one of the best air passenger terminals in existence, as well as one of the finest revenue producing propositions. From the latter angle, the dining room is perhaps of the greatest importance. It will seat 252 persons. There will be a window chair floor in the center and music will be provided by an orchestra seated on a balcony on one end of the room.

In addition to the dining room, the first floor of the administration building will contain the kitchen, a check-room, women's rest room, a toilet office where tickets in all lines operating from the field will be sold, a waiting room, cigar and movie stand, sofa furniture, telephone office, telephone booths, a bar, a smoking room, news room, a suite of offices for the field flight manager, a mail room, an express room and a dock for loading and unloading mail and express. The second floor will be occupied by the offices of the companies operating from the field. The airport manager's office will be at the front of the building and is to be unenclosed, a control tower from which the flight will be controlled and the public address system operated.

Several months were devoted to study, before any decision was made as to the type of runways that would be constructed at Fairfax Airport. The leading strip at General Central Air Terminal, San Diego, Calif., in the eyes of the Fairfax management seemed to present many advantages, but it was decided to conduct an experiment with an area treated in a somewhat the same manner before a final decision was reached. As a result, a plot of

ground 200x200 ft. was set aside for that purpose early in the summer of 1929.

The soil was first plowed and then worked over with a scarifier until it had been pulverized to a depth of about 12 in. Then old asphalt in liquid form was applied, and the soil had been thoroughly penetrated. This required from 15 to 20 applications, depending upon the composition of the ground. About 4 gal. per sq. yd. was applied at a time, so it will be seen that each square yard took from eight to ten gallons of asphalt. After each application, the soil was dried, and following the last asphalt application, the area was rolled with a 20-ton roller. All plots using the field were then asked to land their planes on the 200-ft. square. The results were excellent. The hard structure, consisting of asphalt and soil, held the surface firm and the surface layer was not worn down, the present runways have been prepared in identical the same manner on the smaller plot of ground. The extension to be constructed when Goose Island and the channel become a part of the port will duplicate the same.

CONSTRUCTION of the drainage system has been completed. The field is drained off toward the southeast and under the dike at that corner. There is a natural slope in that direction. For sanitary reasons, a pump house has been erected at the place where the dike runs under the levee, so that the water may be pumped over it to high water. Through this arrangement, there is no danger of the water backing up in the system. Incidentally, concrete pipe is being used for the drainage system, instead of the more customary tile or iron piping.

The landscaping of the ground about the hangars has also been completed. Seventy-five thousand plants and shrubs have been planted by the landscaping division of Woods Brothers Corporation, and the airport is a very attractive garden spot with its green lawns, ornamental vine trellis and lush rambling roses.

The square formed by the two wings of the administration building and the junction of Fairfax and Patton Roads is particularly attractive. In addition to the greenery and shrubs, there is a concrete road which is accented with goldfish. At either end are fountains, adaptations of a well-known European work of art. Toward the road, in back of the road, is a beautifully designed drinking fountain, and at the farthing rock, fountain and garden walks have been constructed. It should be mentioned also in speaking of the landscaping, that in a corner of blue grass and white clover is to be seen between the runways on the field itself.

The entire landscaping plan was decided to present an attractive appearance from both the ground and the air. Air transportation was not the sole object. Officials of Woods Brothers felt that there was something of more importance. They felt that by making the airport as beautiful as possible, it would be possible to make it as a prospective air traveler. In other words, the landscaping was done as an effort to lure air travel as far as possible with the things people have known for generations. The management believes that the landscaping of Fairfax Airport has had the desired effect on the public. Carrying out the landscaping plan, special attention has been given to some of the lighting fixtures at night. Take the building floodlights, for example. Instead of the usual variety, batteries of two and four General Electric floodlights have been mounted on arms extending from the upright well-designed masts. These floodlights were manufactured by the Union Metal Man-

ufacturing Company, Canton, Ohio, and are the latest thing in street lighting equipment. Floodlights have also been installed in the vicinity to the corner of one of the hangars growing another extension of the trend.

On the other hand, no attempt has been made to disguise much of the lighting equipment. The three field floodlights are of the 5 kw. and the other two of the 10 kw. type, are mounted separately on metal standards made from iron casings. Two men of the 10 kw. variety are to be added. One will be placed at the south and the other at the east side of the field. In carrying out the field beautification program, the management at Fairfax Airport might as well follow the example set by the officials of the Curtiss-Wright Airport in the remodeling of the main building. The main field will be remodeled so that the 15,000,000.00 sq. ft. hangar, located in a small brick building that is in keeping of the design of the hangar unit and is very attractive. Semi-enclosed doors cover the less of the light when it is not in operation, avoiding the necessity of using facing to keep the curtain pulled away. Similar structures for the smaller lights in use at Fairfax and other fields could be employed to advantage.

The appearance of the other lights ordinarily used as an airport is not of particular importance. The case of secondary structures, such as the taxiway lights, the field, are constructed to serve both the purpose for which they are intended. It is desirable if their appearance could be improved upon without some sacrifice in both efficiency and safety. Moreover, auxiliary lights are mostly as far from the spectators that beauty is a minor consideration. The 8,000,000.00 sq. ft. hangar at Fairfax Airport with its natural light and the corner lights which form the letters "FAX" are mounted out at the way on the roof of the side hangar. There is a ceiling projector, of course, and it is used under the administration building. Cross-hatch work lights are mounted 150 ft. apart along the edges of the runways, and the port has an automatic way side that runs on the given runway, automatic according to the direction of the flight. In the construction it might be noted that some of the lights are mounted 100 ft. apart, and some are additional lighting equipment in the form of 300 ft. long directional floodlights is being installed.

SOME attention has already been made of the Fairfax auxiliary port at Wrentham, Va. In addition to this, Fairfax Airport, Inc. is maintaining three other auxiliary fields. One of these is the 200-acre Raccoon Field at St. John's, Va. The second is known as the Ardmore Airport, although it is near Sage Lake, across the river from Ardmore, Va. This field covers 150 acres. The third is the 220-acre Parkville Port near Parkville, Mo. A shelter is the only structure on that field, since it is just across the river and a little to the west of Fairfax Airport. The reason for this is that the auxiliary port was to be possible a suitable field for student instruction as a means of preventing congestion at Fairfax Airport. This field and the other auxiliary fields provide emergency landing areas for transport planes should the main hangar had weather conditions at Kansas City. But all of these things are simply added extensions of the manner in which Woods Brothers are running the airport industry. The organization has met with success in other lines of endeavor, and, from its record up to date and its plans for the future, it looks as though the airport business would soon be added to the list.



The authority test approach to the administration building at Fairfax Airport.

HOW Aviation LOOKS to Us



E. L. Cord, president of the Cord Corporation

By L. B. MANNING
Vice President, CORD Corporation

The Reason for the Cord Corporation's Entry Into the Industry, and the Manufacturing and Merchandising Policies

spent on engines and planes, the extremely high cost of highly alloyed materials bought in small quantities did not enable manufacturers to quote lower prices without loss. Not until some manufacturer was in a position to introduce new methods of buying, production, management, and merchandising, could any material progress be made.

Our surveys of the aviation field showed us that a considerable part of the cost of an airplane was in the engine and in our opinion these prices have been excessive. With our vast resources in buying, experience in production methods and large and diversified engineering staffs, we felt we were in a position actually to reduce engine costs and provide even better power plants than had hitherto been available to airplane builders. Hence we decided to enter the aviation industry through our Lycoming engine plant at Williamsport, Pa. This company was then producing at the rate of 20,000 passenger car, truck, and marine engines annually, and aviation engines could be added to the list with little additional overhead. Two and one-half years ago we built our first experimental aircraft engine.

WE HAD to produce a quality product throughout, one that would be consequently free from operating troubles and have a longer life than other power plants on the market. We also decided at the outset that the engine should be equipped with an electric starter which would at once eliminate the cause of many accidents and add to the ease of operation.

Inquiries concerning accessories from various parts manufacturers soon revealed one reason why aircraft engines were so costly. The word "aircraft," it seems, when associated with any product, for no apparent reason, inexplicably increases its value. We had also striking experience with that sort of thing. For instance, we discovered that a certain small part which we had been using in our regular Lycoming engines was identified in size, shape, threading and material with one used in our aircraft engines. This part cost us 17 cents for the automobile engine, whereas it was quoted by aircraft purveyors at four dollars.

Therefore, when we found that certain types of other important parts and accessories used on engines comparable to the one we planned to manufacture were excessively overpriced, we entered into negotiations with various makers who cooperated in the development of a new and better equipment. By purchasing this equip-



Front view of the new Williamsport prototype, "Mothair" powered with West 100 hp. Lycoming engine.

ment in comparatively large quantities we were able to obtain many parts at figures more nearly proportionate to what they would cost for other types of standard automobile engines which, of course, reduced the total manufacturing costs.

In going ready for this aircraft engine program we first drew into our organization the best aircraft engineers available as the nucleus for a separate engineering staff. They all types of aircraft engines were thoroughly studied. In a little less than a year we had produced our present nine-cylinder Lycoming model aircraft engine. While this engine was ready to announce and was actually displayed to the public a year ago, we withheld placing it on the market until it had undergone further exhaustive and crucial tests in various types of planes by our own experimental department. We preferred to do our own development work rather than leave it to the public.

Through our experience in buying in the automobile field, our heavy requirements, and connections with parts sources, and through our consultation of the most reliable

machinery we were able materially to reduce the costs of engine production and still provide a greatly superior product.

It was at once apparent that if prices on completed planes were to be reduced materially the plane must be built and sold as a unit. By that I mean that it would have to be a standardized product just as an automobile is standardized. The buying public, if it was to pay less for its plane, would have to buy models and not individually made planes, any more than it could buy a Packard car with a Lycoming engine, or an Auburn with a Buick power plant. To meet the various needs of the public different models would have to be offered that would do a particular job.

FOR THIS reason we did not advertise a price on the Lycoming engine at the St. Louis Show, although there was considerable comment because of this. But whether to there an advertised price on an automobile engine. It is Mr. Cord's belief that the public once it has the opportunity, will come to think of planes in terms, rather than as of flying machines made up of various parts.

Then we looked about for a plane manufacturer who was in a position to carry out the policies which we advocated—that of producing a sale, reliable cabin plane at the price of a fine motor car. We felt that based on present production of any existing companies, such a price would be wholly unobtainable and required. The company which built such a plane would have to be in a financial position and have such confidence in the future of aviation that it would be willing to invest present profits in the belief that airplanes would be bought in sufficient quantities eventually to reimburse for the pioneering. When that time came there would be substantial profit.

E. L. Cord, president of the Cord Corporation, and myself, as well, had been flying Stinson planes for nearly two years in our business. I had flown my own Stinson more than 250 hours and had found it to be a thoroughly safe and reliable craft. The Cord Corporation acquired control of the Stinson organization Nov. 1, 1933, and at the St. Louis Aircraft Show, we announced the four-place Stinson Junior China plane, powered with a 210-hp. Lycoming engine, at a retail price of \$5,795. There were no extras.

The setting of the \$5,795 figure on the Stinson Junior was not an attempt on our part to start a price war in the



Rear quarter view of the 110-hp. Lycoming engine.

THE US flying is transportation. It is a method of getting from here to there. The public has always sought an improved method. The car, the rail, the stage coach were discarded for the faster, the locomotive, the automobile and now the airplane. It is a recorded fact that these forms of transportation have made tremendous strides which have afforded the public additional time saving, comfort, and safety at a cost that has made their use accessible to a large body of the public. In entering the field of aviation the Cord Corporation has kept these factors uppermost and our entire aviation program revolves around their development as applied to the airplane.

Marked progress in any industry depends on low acceptance. It is our belief that if the public is to enjoy the full benefits of aviation, planes must be produced and sold in encumbering volume, at the same time maintaining ever higher standards of engineering, design and production.

Before any great volume is possible, complete and finished planes must be produced at prices that will place them within the reach of a greater number of buyers. Previous to our entrance into aviation production had been in build planes, engines and accessories as individual units and these in limited quantities. Hence unit prices were usually high, and finished products were selling at a figure which at once made them prohibitive to the general public.

Perhaps at that time those prices were justified. The building of planes is entirely different from that of any other kind of vehicular production. The highly trained technical engineers needed, the fine workmanship

industry. It was the first step in our aviation program of selling planes available at prices that will greatly enlarge the buying public. We believe that the entire industry will benefit.

In the actual production of Stinson planes we found that smaller type sources could be effected as in the production of the Lycoming engine. The Wayne plant was completely overhauled, new machinery added, straight production lines installed and other economies effected throughout the plant. Parts and materials were bought in large quantities by trusted buyers at a price. Many parts, heretofore made by hand were now stamped and wings assembled in new type production jigs. Last season was allocated in this assembly with actual production costs in some instances reduced 300 per cent.

AN EXAMPLE of it is that under our present system of production workmen become experts on the one job they do. Under the present system of building airplanes most of the men were so-called "jack of all trades." That is a wilder might help assemble, run a turn-on or apply a coat of lacquer. Under the system we are employing at Stinson not only does a worker actually work, but each worker has particular parts that he works only. A man who works on a fuselage does so on an engine mount, and more, he works only on certain parts of the fuselage. Thus day after day the same type piece is before him to build, the same operations are repeated and the time needed must be obtained.

The establishment of this method throughout the entire plant has resulted in increased efficiency and quality of workmanship and materials and giving the public a much superior product at low cost.

We have been asked why we produce civil planes exclusively. As previously noted one of the prime factors that leads to acceptance of a new line of transportation is comfort. Unquestionably there is a field for the open cockpit plane, but in our opinion the greatest field, first as the closed one. When flying left the "open period" a life behind in the helmet and the goggles, the appearance of a "hard man." The man of business, even the cabin plane is the same clothes that he wears in his office and he is surrounded by the same business and accidents that he is accustomed to in his business. If he desires to fly the plane himself a seat is directly

along side that of the pilot where he can operate the plane with the dual controls.

Moreover, we hold that it is easier to teach a man to fly in an enclosed plane than in an open one. The instructor and student sit side by side in the cabin area. Demonstrations of actually work is done to operate the plane are more easy. They can converse, ask questions and the student can actually see the various movements. Besides that, he is not distracted by the propeller blast, heavy clothing and all the other things that go with flying in an open cockpit plane. At one time it was claimed that the only way to learn to drive an automobile was by having the top down and feeling the wind blow against your face.

It is our belief that most business men who buy airplanes are not in a position to spend a great amount of time learning to fly. Rather, the tendency is to learn gradually as they fly with their pilots. This was the case with Mr. Cord.

Two years ago Mr. Cord bought a Stinson plane, hired a pilot and began his business trips by air. The first time he was up he took the dual wheel along side that of the pilot. He found that flying the plane was easy. There was no traffic, no cross roads and that the plane actually flew itself. On each one of his subsequent trips he flew the plane for a period and in about six months' time he had become a pilot first. In this way he became proficient enough, and had enough hours in the air to share his know.

We will be constantly striving to improve the designs of our planes but the changes that are made in any year's models will not be of a nature to render the present ones obsolete. This we believe, is a promise for the buyer's investment and as this policy has been unusually successful for us in the automotive field we believe it will likewise be approved with regard to planes.

While there are certain general merchandising principles which we are applying, we are not employing automobile methods in the sale of airplanes. We believe that such field is distinct.

In 1928 for example, 75 per cent of the sales of Stinson planes were made by the factory. That will not be true hereafter. Since January first we have more than doubled the size of the old Stinson dealer organization, and are constantly adding to it. In only one in-

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stances have we granted franchises to our automobile dealers in the United States; in fact, we are exerting every effort to discourage the practice. An automobile man who could sell perhaps three or four cars a week might spend the whole of that time in a vain effort to sell a plane to a prospect. As a consequence, both branches would suffer in the long run. The situation in the foreign market is somewhat different.

One of the outstanding innovations we have brought into the manufacturing and in the upper service factory branches. To date we have established three of these branches: Buffalo, Calif.; Ft. Worth, Tex., and Chicago, Ill., and plan for additional ones.

The purpose of these branches is to assist both the dealer and the public. As aviation expands, improved service to place orders becomes imperative. Few dealers are at this time in a position to give complete service such as a factory can, but it is impossible to adequately service the entire country from one point. In establishing these factory branches in strategic points of the country, centers of Stinson planes will be able to get factory type service with a short radius. Each one of these branches will carry on hand a full stock of parts and other airplane materials. Factory type satisfactory will be identified for servicing and factory trained men will make up the personnel. In addition to this, experts from the Lycoming plant will be placed at the head of these branches to service Lycoming engines, and similar experts familiar with the Wright and Pratt and Whitney engines which we also sell, will be assigned at the branches.

THE ESTABLISHMENT of these factory branches will in no way affect our dealers, but will materially assist them in their service to the public. Only those service jobs which they themselves are not equipped to handle will be sent to the factory branch, and in addition time will be saved on their obtaining parts and materials.

One feature of these branches which is having a strong appeal to dealers is that a full line of Stinson planes will be carried at the branch. Dealers, unable to carry a line as large as one of two models, can fly their prospects to the nearest branch and then get a demonstration in whatever model is wanted. We plan also, to ship planes knocked down to these branches in cartons, then to be assembled and in this way again reduce the delivery cost of our planes to the public.

A new feature which we will pioneer within the next few months is that of selling flat rates for specific service jobs. Therefore the owner of an airplane which had an idea of what a service job would cost him. Under this plan if the owner of one of our planes wants a top painted made on his engine, or any other work of a similar nature, he will know exactly what it is going to cost him. There will be a standard price for the parts and also standard discounts. The discount given the factory branch will be sufficient to defray the cost of handling the parts and dealer's discount will be enough to provide them with a profit.

The question of what we intend to do for our dealers is pertinent. I will answer that by saying that we believe that volume sales of airplanes can only be reached by a strong dealer organization.

In building up such an organization to begin with, we have given our dealers the greatest airplane value ever offered the public. We have given them a safe plane, that offers all the comforts and luxuries of the finest type of transportation, and we have given it to them at a price

that is approximately 50 per cent less than any such plane has ever been available to the public before.

Next he has a complete line ranging from the four-passenger to the ten-passenger Tri-motored Airliner Transport. In between these prices are six other models, with various types of engines, instruments and designed for a specific purpose and such at a price far below comparable value.

IT IS our belief that the greater public acceptance of the airplane will mean with the public becoming informed of how safe it is to fly. How easy and how comfortable. The first step is to present the facts to show that they lie then get into the planes themselves. In this regard we have laid down a national advertising campaign which includes material management and the aviation trade papers. Perhaps one of the most important dealer jobs will be to get a national finance plan. Representatives are now under way and we expect within a short time to be able to recommend to our dealers a plan that will materially assist them on plane installment selling.

While we believe that the greatest airplane market lies solely in the reaction of business, in purchasing 1930 programs we have endeavored to create a widely diversified field in aviation.

In reply to the question of "news of what age offer the present market for planes." I would say that we believe from 25 to 30 per cent of the sales of the airplane in that age are old enough to be earning sufficiently to consider the purchase of a plane and at the same time young enough to want to learn to fly. In all probability we will urge our dealers to concentrate on this market. However, the age is just a estimate. It has been shown at one time that the older generation would occur drive automobiles.

The buying of an airplane is in many ways similar to buying an automobile, radio or a motor boat. As to the question of "how to sell a plane," I would like to see me to be up to the individual salesman. He probably will establish his prospects just as a real estate, automobile or hand salesman does. Obviously if a man hasn't the money to buy a plane, or sufficient credit, the salesman will probably be looking for him trying to sell him. If, however, he has sufficient money, the salesman is not going to buy but has some latent fear of his own or of family, then a certain amount of salesman diplomacy would have to be used.

We do not feel that a salesman must primarily be a pilot. He should be able to fly and he must know the aviation industry thoroughly, but most of all he must be a salesman. If a pilot has these qualifications then he has a great advantage. If not, his success in selling planes will probably be limited.

One thing is obvious in our opinion as to our dealers is that they will have to be in a position to teach their customers to fly. Of course neither we nor the public, expect them to do this without compensation, but the facilities must be available.

The reduction in plane costs to the public which we have effected have brainfaded the market away fully, but not sufficiently, to bring attention to the point whereby it becomes one of America's great industries. This can only be accomplished when planes can be produced and sold at a price which will place them in the hands of the ordinary man.

We are looking forward to the not distant future when we will be able to produce a plane of even greater value than we are giving today at the cost of a suburban priced automobile.



A general view of the wing department of the Stinson aircraft factory

Airway Briefs

International Airways Corp. plans to open a daily Kansas City-St. Louis flight, via Des Moines, with stops at Oklahoma City, Dallas, Fort Worth, and San Antonio.

Jetliner Airways, Philadelphia 1, Pa., which recently changed management, was formally reopened June 21-22.

A passenger line between St. Louis and Jefferson City, Mo., with two round-trip daily flights, with stops at Kansas City, has been started under the direction of W. G. Shaffner, Jr.

Night flying on National Parks Airways between Salt Lake City and Grand Falls, Minn., was expected to begin June 1 with the completion of lighting installations and emergency radio.

It is rumored that Air Service, Ltd., operating amphibious service in San Francisco Bay, may start a similar line between Boston Island and Battery Park, New York City.

Plans are being used to start mail pilots on Canadian Colonial Airways Ltd. mail service with the agreement of Canadian weather broadcasting stations to be installed at New York, Albany, and Montreal, and not yet in use.

Private Flying Service has begun operations at Houston (Lex) Airport.

S.A.F.E. is said to be considering conversion of its line from Dallas to Houston, Tex., and possible introduction of a new line from Houston to Chicago via Little Rock, Ark., and St. Louis, Mo.

Frank A. Barry has opened a tourist service bureau at 426 W. 34th St., New York City, which gives special emphasis to aviation education.

Venue of Fortis, Ill., will double July 15 whether or not to levy a special tax to provide a \$200,000 fund for a municipal airport.

Gasoline rates at Lincoln (Nebr.) Municipal Airport increased from 54¢ gal. in April to 1.15¢ gal. in May, and receipts were \$240, for the city.

A weather reporting bureau is to be established at Love Field, Dallas, Tex., equipped with ground facilities.

Work on four emergency fields and ten hangars into the Brownsville-Kingsville section of the Brownsville-Houston (Tex.) airport has been completed.

S.A.T. Division of American Airways has incorporated double plane service on the Dallas-San Antonio route.

Bonanza, Tex., has voted to invest \$100,000 of airport bonds.

National Air Transport carried 14,998 lb. of cargo in addition to mail over Chicago-Dallas-Chicago-New York routes during May.

Consolidated Air Lines, Inc., Oakland, Calif., plans to establish an airline between Sacramento and Monterey.

Gold, with stops at several points in a feeder line for the regular coastal route.

T.A.T.-Madden Air Lines and Pacific Steamship Company have made arrangements to ship passengers and cargo between Los Angeles and San Francisco and proceed to Seattle by boat.

Storck Oil Co. has issued an aerial billboard opposite the Municipal Airport at Tulsa, Okla.

Bridgesville, Tex., has voted to establish a municipal airport.

Resolutions approving a campaign to encourage the construction of airport facilities and extension of air mail routes were adopted for the delegates to the annual convention of the U. S. Junior Chamber of Commerce, held a series of freshly-minted delegates.

State Aviation Inspector Robert L. O'Brien has moved from his old suit and equipment from the Registry at Boston Yuliches to the Boston Airport.

Whitcomb-Lucas Airport, Whitcomb, Wis., was formally opened June 1.

A sum of \$200,000 was transferred by the Federal Reserve to Miami, Fla., under a new plan to establish a new Miami bank.

Two-way radio communication was reported installed by Capital Airlines, Inc., at the New York Thruway Airport in New York City.

Imperial Airways, Inc., has opened a maintenance headquarters from Birmingham, Ind., to Sky Harbor, Minneapolis, Minn. The company is planning to start passenger service from Sky Harbor to Tucson, Canada, during the Canadian National Exhibition, Aug. 22-26-30.

Alcoa 900 Florida buses will take their own route marked in large letters on different highways under the direction of the Florida State Chamber of Commerce.

N. Y. Washington Service Opens

NEW YORK (AP, N.Y.)—Eastern Air Express, a subsidiary of the General Air Corp., began a passenger service between New York and Washington June 12. A round trip will be made each day except Sunday. Grand Central Air Terminal at Jackson Heights and Roosevelt Field will be the local and Washington bases, respectively. A two-engine twin-engine passenger Sikorsky biplane is being used.

The schedule is as follows:

To New York	From New York
10:00 a.m.	10:00 a.m.
1:00 p.m.	1:00 p.m.

Gliding Field at Cleveland

CLEVELAND (AP, N.Y.)—Another "glider" has been established near Cleveland. It has been named Hoshok. Glidermen in hopes of the new use of the property have been in the local area since about for primary and advanced gliding. Facilities for soaring are being developed.

Larger Colonial Crew At Boston Requested

BOSTON (AP, N.Y.)—Colonial Air Transport continues to run capacity and extra section trips between Boston and New York and, meanwhile officials are waiting the report of Post & Wilson, who are examining the wreckage that caused the recent accident. According to Robert L. O'Brien, state supervisor of aviation air disasters, the investigation is being conducted by Post & Wilson engineers.

The first thought of the investigation was a series of fresh inquiries to a search checking disclosed nothing to indicate there are mechanical defects.

As the wreckage was full of water and the rest of the engine thoroughly checked it was impossible to tell whether a drop of water in the gasoline was the cause or had any indication of leading up. Striker from the passengers in the number the engine was the cause of the accident.

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Foreign Activities

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Australian Airlines Report Plans, Progress

MELBOURNE (AUSTRALIA)—During the first three months of operation (Jan. 1-March 31) of the unincorporated Sydney-Brisbane daily service flown by Australian National Airlines, Ltd., 244 paying passengers were carried as well as 2,834 lb. of mail. The total mileage for 153 trips completed was 9,284, and the regularity of service was 99.9 per cent.

The company uses five three-engine Aero Twos, and a Little Mink. There have been no accidents, and only one forced landing.

The Commonwealth Government has agreed to renew for three years the contract subsidizing the Perth-Brisbane airline operated by West Australian Airways, Ltd., and plans are being made to extend the route to Wyndham.

The company's Perth-Brisbane route is also to be extended to Sydney. This extension will take 4 hr. and will probably be flown in two days, to make emergency. Fare will be about \$60, including hotel accommodations at Perth, where the overnight stop will be made.

When these services are started the company will be operating a little more than half way around the rim of the continent.

Four bi-engine passenger Vickers "Vigors" planes have been ordered, and will be delivered in October. They will be used on the new line.

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THE BUYER'S LOG BOOK



This Log is prepared by the editors of AVIATION purely as a service to readers. It contains no profit and no charge solely on their name value, and without any advertising or subscription value. Contributions are invited to assist in making this service.



Glider Safety Belt

A SAFETY BELT specially designed for use with gliders has just been announced by The Ro-well Manufacturing Co., Middleboro, Mass. The design was worked out in cooperation with the American Glider Association Corp. of New York City to the satisfaction of the National Knott.

Features of the belt are the positive back latches and the 8 in. wide waist band which gives support and protects the waist. Buckles are type adjustable through a friction-type buckle similar to the design used on parachute harnesses. The belt is furnished with or without special elastic connecting leads in the form of woven Aero Rings—Aviation, June 23, 1939.

Stabilizer Indicator

A NEW INSTRUMENT for use in aviation which indicates the position of the stabilizer is now in production at the Hartford factory of the Vetter-Roth Corporation.



The Vetter-Roth Stabilizer Indicator

pany. The instrument consists of a small light weight counter geared to the stabilizer controls, which indicates direction, or shows the angle of incidence at which the stabilizer is set. Positive and negative indicators show the degree from "Neutral" and the degree in incidence in standard from 1 to 5—Aviation, June 23, 1939.

Built In Landing Light

A NEW LIGHT IS LANDING LIGHT TYPE ALANER 1250 S is now being produced by The Pyle-National Co. of Chicago. The light is built into the leading edge of the wing and consists of a 12-in. clear plastic reflector; a pre-insulated socket and 12 in. pressure mounted in aluminum frame. The air flow and low convection is designed to give maximum heat, candle power at all angles. The lamp is set with this type of light in the 12 volt 20 ampere per-hour base type recently developed by the Pyle-National and Westinghouse engineers. According to the manufacturer,

type, type LANR light projects a beam wide enough to give full pick up of ground detail from altitudes from 500 to 1,000 ft. The beam has a sharp cut off without any stray light and its white appearance has penetration and increases the visibility of ground detail—Aviation, June 23, 1939.

Aviation Compressor

MORE A-100 air cooled single stage compressor for use in the aviation field has just been placed on the market by the Quaker-State Co. of Quincy, Ill. The unit consists of a 3 1/2 x 4 duplex compressor and a 5 hp motor mounted on a cast iron base on top of the air reservoir. It has a displacement of 25 cu ft per minute operating at a rate of 800 r.p.m.

An outstanding feature is the isolation of the suction and discharge valves in separate compartments. This prevents the air from being heated when passing through the intake valve. An automatic or hand operated start and stop control is furnished as standard equipment and operated in conjunction with the Pyle type pressure and moisture indicator. Lubrication is the standard splash type. Other features of the compressor are the V-type belt drive, low type of flywheel and oil inlet type valve bearing, an atmosphere in the base and a section for the suction opening—Aviation, June 23, 1939.

Blue Diamond Drills

WARMAN & BARNES, Inc. of De Troy recently announced a new type of high speed steel drill to be known as the Blue Diamond High Speed Drill. This differs in design from the regular small high speed drill and is given a special heat treatment. The company states that this combination gives the drill extra strength and ability to penetrate faster. The drill is available in 1/2 in. polished rods 3 to 12 in. in length and with sizes No. 3 to 25 inclusive—Aviation, June 23, 1939.

Phos-Copper Alloys

THE WESTINGHOUSE Electric and Manufacturing Co. has just introduced the Phos-Copper alloys for use in a general welding and brazing material for copper and copper base alloys. Phos-Copper is available in rod and strip forms in copper, stainless steel, copper and steel. Some 5 to 10 per cent phosphorus, the

Trade Catalogs

Five new and revised. The new "Quaker State" Oil, published by Quaker State Oil Co. shows the company's line of aviation and general purpose, line of aviation and general purpose. Twelve new, 100, 125, 150, 175, and 200, and 250, and 300, and 350, and 400, and 450, and 500, and 550, and 600, and 650, and 700, and 750, and 800, and 850, and 900, and 950, and 1,000, and 1,050, and 1,100, and 1,150, and 1,200, and 1,250, and 1,300, and 1,350, and 1,400, and 1,450, and 1,500, and 1,550, and 1,600, and 1,650, and 1,700, and 1,750, and 1,800, and 1,850, and 1,900, and 1,950, and 2,000, and 2,050, and 2,100, and 2,150, and 2,200, and 2,250, and 2,300, and 2,350, and 2,400, and 2,450, and 2,500, and 2,550, and 2,600, and 2,650, and 2,700, and 2,750, and 2,800, and 2,850, and 2,900, and 2,950, and 3,000, and 3,050, and 3,100, and 3,150, and 3,200, and 3,250, and 3,300, and 3,350, and 3,400, and 3,450, and 3,500, and 3,550, and 3,600, and 3,650, and 3,700, and 3,750, and 3,800, and 3,850, and 3,900, and 3,950, and 4,000, and 4,050, and 4,100, and 4,150, and 4,200, and 4,250, and 4,300, and 4,350, and 4,400, and 4,450, and 4,500, and 4,550, and 4,600, and 4,650, and 4,700, 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